



KidSat's NIH Image Tutor

Introduction

This tutorial will be very helpful to those who are first learning to use NIH Image. It progresses in a simple, straightforward manner introducing new commands and techniques.

Before starting the tutorial, you should have Omaha.pict on your computer. You can download the file from the following location:

<http://kidsat.jpl.nasa.gov/kidsat/datasys/help/>

From the same location, you can also download NIH Image for the Macintosh, setup NIH Image with enough memory, and download the KidSat Macros. You will also be able to find the latest version of this tutorial there.

Opening a Picture

1. Start NIH Image
2. From the **File** menu, drag the mouse to **Open...**
3. In the box that pops up, select **Omaha.pict**

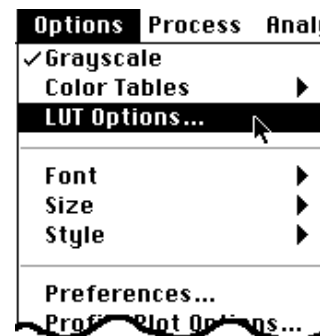
You are looking at an image of Omaha, Nebraska taken from the space shuttle. In this tutorial, you will learn how to use NIH image to annotate an image that is taken from space. Notice the small colored dots that were placed on the image. The colored dots represent places of importance on the image. They are reference points of interest.



Annotating a Picture

To annotate images with different colors, it is nice to have some reserved colors that will not change when you do other image processing tasks. To reserve colors for labeling or other tasks, do the following:

1. From the **Options** menu, choose **LUT Options...**



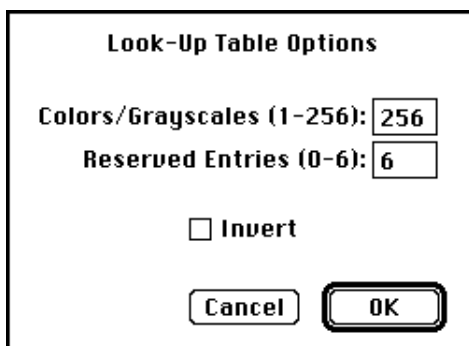





Figure 1



Figure 2




Figure 3

2. In Reserved Entries (Figure 1), enter a number from 1 to 6 (6 is recommended).
3. Click OK - The reserved entries will appear below white
black at the bottom of the LUT window (Figure 2).
4. To make colored dots on the screen, first click on the coordinate tool -  - on the tool bar (Figure 3).
5. Then, click on one of the six lines at the bottom of the tool bar to set the thickness - .
6. Next, click on the green color below white
black on the lookup table (LUT). On the tool bar (Figure 3), note that the brush turns green - .
7. Click somewhere on the image and note the green dot!
8. Make some other dots of other colors at places you might be interested in.
9. Make some bigger dots by clicking on thicker lines below the coordinate tool. That is one way to mark points of interest on a digital image.
10. Go to the **File** menu and drag down until it says **Revert to Saved**.
11. This will bring back a fresh image that just has the original six colored dots.
12. Use this anytime your image is so messed up that you would prefer to just start over. It takes you back to the last saved version of your image.



Adding Text

It would be nice to place text on the image. This would help others to identify parts of the image. You can continue to practice on the file Omaha.pict. Here are the steps:

1. Click on the text tool - **A**
2. Move the cursor to the right of the red dot. Click and type “Millard North High School.”
3. If the paintbrush color  on the tool bar is black, the text will be black.
4. Hit the delete key enough times to erase “Millard North High School,” and then click on the **white** label on the LUT.
5. Click again to the right of the red dot, and retype “Millard North High School.” This time the text is white. Try other text colors if you like.
6. Go to the **Options** menu and drag down to the **Font**, **Size**, and **Style**. Try different fonts, sizes, and styles. Some fonts and styles are easier than others to read, depending on what color image you paste them on.
7. Go to the **File** menu and drag down until it says **Revert to Saved**. This will bring back a fresh image that just has the original six colored dots.

Using Macros

Macros have been created to make some tasks easier. Macros are single computer commands that combine a number of tasks. They are shortcuts to doing a number of manual steps.

1. Go to the **Special** menu and drag down to **Load Macros**.
2. Navigate your way to the NIH Image folder on your computer. Go to a folder called **Macros** and open **KidSat Macros**.
3. Drag down again on the **Special** menu and you will notice a number of new items below the **Load Macros** item.
4. Drag down until you get to one called **Annotate Image With Text**.
5. You may get an error message stating that you need to run the **Windows to Stack** macro. If you see that message:
 - Drag down the **Special** menu to **Windows to Stack**.
 - Now, drag down to **Annotate Image With Text**.
6. A dialog box will open that asks you to type in the feature name. Type in “Missouri River” and press return.

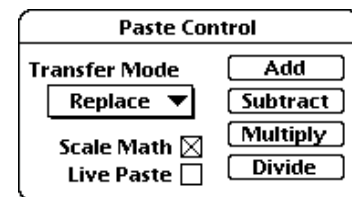


7. Another dialog box will appear asking you for an angle. Type in 45 to represent a 45° angle. This will place your text at a 45° angle below the x axis.

8. Go to the **Edit** menu item and drag down to **Paste**.

9. Drag the text to a location you would like it to be on the screen. Recommended is the lower right corner.

10. At this point, a paste control window should be visible. In it, drag down on the **Transfer Mode** command until it says Replace. Then click anywhere else on the image. The text is now part of the image.



11. Try pasting different colors, fonts, and angles.

12. You can change the color by first choosing the color you want on the LUT and then going to step 4 above.

13. Drag down on the **Window** menu item to **Hide Paste Control** to get rid of the paste control window.

14. On the tool bar, select the line tool - .

15. Click somewhere near the Missouri River text and drag a line to the river that is in the right one third of the image.

16. Drag down on the **Special** menu until you get to the **Draw Arrow** macro. An arrow will appear at the end of the line segment.

17. Try drawing more arrows, but try different colors and line thickness. Drawing arrows is very helpful for identifying features on an image.

18. Try other KidSat macros. Experiment with them to find ones that would be useful in your efforts to annotate an image.


19. Finally, go to the **File** menu and drag down until it says **Revert to Saved**. This will bring back a fresh image that just has the original six colored dots.

20. If this does not work, go to the upper left hand corner of the image and click on the little box. Don't save your changes. Then go to the **File** menu and drag down to **Open...** and choose Omaha.pict image again.



Locating Sites

Digital image information is organized by x and y values. X values increase horizontally from the left and Y values increase vertically from the bottom. In this section, you will learn how to perform measurements and scaling using NIH Image. You should have the file Omaha.pict opened.

1. Select the coordinate tool from the tool bar - 
2. Move the mouse around and see the values change in the info window located at the lower left of the screen. You might need to drag the title bar of the info window to a location where you can see it and the image at the same time.
3. Try to find the x = zero value and the y = zero value.
4. Try to find the maximum value for x and y.
5. If the lower left corner is not close to x = zero and y = zero, go to the Options menu and drag down to Preferences. In the box that pops up, click on Invert Y Coordinates.
6. Find the x and y values for each of the colored dots in the image:

Info	
x :	80
y :	49
Value :	68

The green dot is STRATCOM. This is the command center for our nation's strategic air command. The runway can be seen below the green dot. It is also the site on which the Enola Gay B-29 bomber that dropped the first atomic bomb on Hiroshima was built.

The red dot is the site of Millard North High School.

The purple dot is the town of Fremont, Nebraska.

The aqua dot is Council Bluffs, Iowa. It is named for the bluffs that were formed from glaciation during the Ice Age. The Loess Hills are bluffs that are silt sediments from the glaciers. The dark areas to the right of the Missouri River are all bluffs. The Missouri River is the boundary between Nebraska and Iowa.

Below the dark blue dot is Epply Airfield. If you ever fly a commercial airline to Omaha, this is where you will land.

The yellow dot is Blair, Nebraska, the home of Dana College. Teachers and students learn about KidSat at the TREK institute. (Technology Resources Exciting Kids)

Move the cursor to (123,446). This is the Platte River Valley. The Platte is the river the pioneers followed on their way west.

Move the cursor to (191,499). This is the Elkhorn River Valley. The Elkhorn River is a tributary of the Platte River. The Platte is a tributary of the Missouri River.


Move the cursor to (345,383). This is the location of Central High School. The historic building it resides in once was the state capitol. Central High is also nicknamed "I-Back High" because of all of the great football I-backs it has produced. Gayle Sayers, Calvin Jones, and Ahmon Green are all graduates of Central High School.


Measuring



Since all of these value represent pixels, (little dots that make up the entire image), and they are all the same size, we can set up a pixel to distance ratio and measure things on the screen. Kidsat images downloaded from the data system will have a frame height and width. You can use these numbers to set a scale on your image.

1. The frame width of Omaha.pict is 55 miles.
2. Go to the upper right hand corner on the menu bar of the image and click on the little box. The image should resize itself so that the entire image fits on the screen.



3. On the tool bar, select the line tool - .
4. Drag a line the width of the entire image.
5. Then go to the **Analyze** menu and drag down to **Set Scale**.
6. In the dialog box that appears, go to **Units** and drag down to **Miles** and release the mouse.
7. Then go up to **Known Distance** and type in 55. Click on OK.
8. Go to the **Analyze** menu and drag to **Measure**.
9. Go back to the **Analyze** menu and drag to **Show Results**. The length should read 55, meaning 55 miles.

10. Put the cursor on the red dot and drag to the yellow dot.
11. Select **Analyze - Measure**, then **Analyze - Show Results** (just like before). The length value is the distance between Millard North High School and Blair, Nebraska.
12. Measure other distances. If your list gets too long, choose **Analyze - Reset** to clear the values.
13. If you open different images, you must reset the scale prior to making measurements. (Start with step 1, above.)
14. Go back up to the upper right corner in the title bar, and click on the little window again.
15. The screen should change to a larger size.
16. Go to the tool bar and select the hand tool - .
17. Move the cursor to the image. Click and drag the image. The hand tool lets you move the image around on the screen.
18. With the new, larger image, you might remeasure some of the segments. The measurements should remain the same. (Measurements might vary slightly depending upon which pixel is selected on each end of the line.)

19. Go to the tool bar and click and hold on the line tool . A box should appear that lets you drag down to the freehand line.
20. Try to trace around the Omaha region as best you can in one continuous line. The grey-green area is Omaha. It has several lakes around the perimeter and is bordered on the east side by the Missouri River.
21. When the freehand line is completed, the line should appear in crawling-ants mode.
22. Select **Analyze - Measure**, then **Analyze - Show Results** (just like before). The area and perimeter of the Omaha region should be displayed in square miles.
23. Note: None of these measurements are perfect. All measurements include sources of error. One of the larger sources of error in this image is that the image is not nadir. The camera was not looking straight down like those taken during KidSat missions. Images such as these are called low oblique. That means at a slight angle from nadir.
24. Another very useful tool is the magnifying glass . Click on the magnifying glass and then click on the image. The image is magnified. Click again and it is magnified more. If you keep clicking, the image will finally become unrecognizable.
25. To zoom back out, hold down the option key and click again. You will notice that the plus sign in the magnifying glass becomes a minus sign.
26. Open up a few KidSat images of interest to you and try out your new annotation skills. It is very helpful to have maps and atlases available. Refer back to this lesson at any time you can't remember the steps.